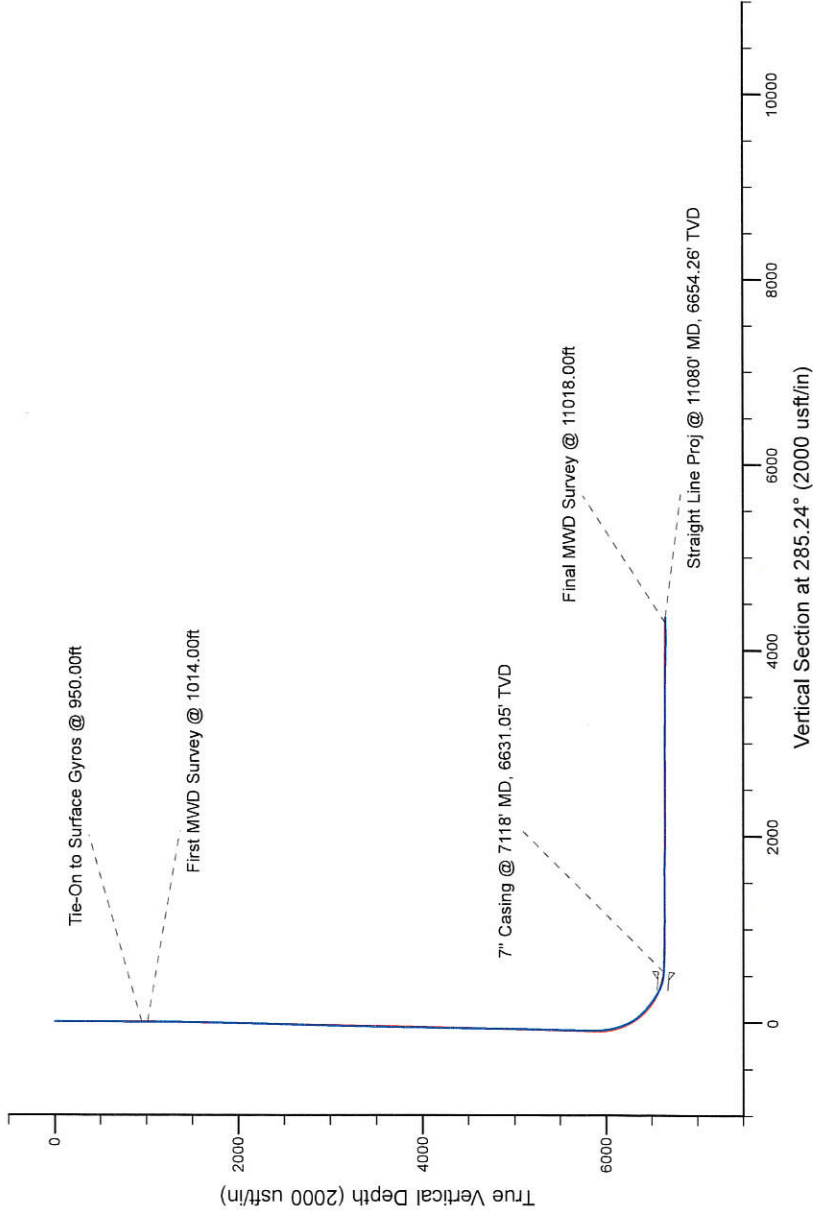
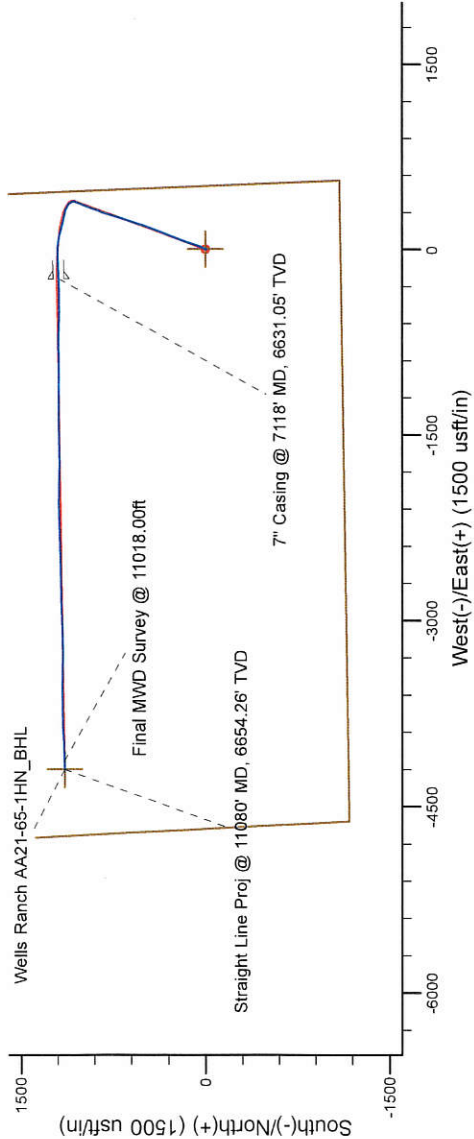


Project: Weld County, CO (NAD 83)
Site: Sec. 21-T6N-R63W (Wells Ranch AA South 21)
Well: Wells Ranch AA21-65-1HN
Wellbore: Plan A
Design: Final Surveys

Noble Energy



LEGEND

- Wells Ranch AA21-65-1HN, Plan A, Rev A1 - PROPOSAL V0
- Final Surveys

Platted SHL: 1100' FSL, 531' FEL
Platted Lat/Long: 40.46789 N, 104.43412 W
Location: Sec. 21-T6N-R63W

7" Casing: ~2296.79' FSL, ~701.75' FEL
Lat/Long: 40.471168 N, 104.434927 W
State Planes - CO Northern: 1,416,266.21' N, 3,296,315.27' E
Location: Sec. 21-T6N-R63W

BHL: ~2311.11' FSL, ~536.40' FWL
Lat/Long: 40.471169 N, 104.449162 W
State Planes - CO Northern: 1,416,219.33' N, 3,292,355.22' E
Location: Sec. 21-T6N-R63W

WELL DETAILS: Wells Ranch AA21-65-1HN
Ground Level: 4730.00
RKB-24 @ 4754.00usft (H&P 322)

Created By: Fred Hartmann
Created On: 02/18/2014

Noble Energy

Weld County, CO (NAD 83)

Sec. 21-T6N-R63W (Wells Ranch AA South 21)

Wells Ranch AA21-65-1HN

Design: Final Surveys

Sperry Drilling Services

Final Survey Report

18 February, 2014

Well Coordinates: 1,415,075.01 N, 3,296,554.19 E (40° 28' 04.40" N, 104° 26' 02.83" W)

Ground Level: 4,730.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Wells Ranch AA21-65-1HN

RKB=24 @ 4754.00usft (H&P 322)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Wells Ranch AA21-65-1HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250.00	0.40	203.38	250.00	-0.80	-0.35	0.12	0.16
500.00	0.40	97.08	499.99	-1.71	0.17	-0.62	0.26
750.00	0.40	266.78	749.99	-1.87	0.17	-0.65	0.32
950.00	1.20	192.88	949.97	-3.95	-1.00	-0.08	0.58
Tie-On to Surface Gyros @ 950.00ft							
1,014.00	1.41	220.07	1,013.96	-5.20	-1.65	0.23	1.01
First MWD Survey @ 1014.00ft							
1,107.00	1.24	217.44	1,106.93	-6.88	-3.00	1.09	0.19
1,200.00	1.19	21.38	1,199.93	-6.78	-3.26	1.36	2.59
1,293.00	3.32	32.20	1,292.85	-3.60	-1.47	0.47	2.33
1,386.00	5.66	27.30	1,385.56	2.76	2.07	-1.27	2.55
1,479.00	8.33	26.20	1,477.86	12.88	7.14	-3.51	2.87
1,574.00	9.93	21.22	1,571.65	26.69	13.15	-5.67	1.88
1,669.00	11.94	21.13	1,664.92	43.49	19.66	-7.53	2.12
1,763.00	12.60	18.73	1,756.78	62.27	26.45	-9.15	0.89
1,858.00	14.66	16.51	1,849.10	83.61	33.20	-10.05	2.24
1,953.00	15.50	15.12	1,940.82	107.39	39.93	-10.28	0.96
2,048.00	14.60	19.20	2,032.57	130.96	47.17	-11.08	1.46
2,143.00	14.19	19.88	2,124.58	153.22	55.07	-12.85	0.47
2,238.00	14.70	21.64	2,216.58	175.37	63.48	-15.14	0.71
2,333.00	14.72	19.30	2,308.47	197.97	71.91	-17.33	0.63
2,427.00	15.77	24.80	2,399.16	220.83	81.22	-20.30	1.90
2,522.00	16.61	20.30	2,490.40	245.29	91.34	-23.64	1.59
2,617.00	15.28	17.50	2,581.74	269.96	99.82	-25.33	1.62
2,712.00	15.20	21.88	2,673.41	293.46	108.22	-27.26	1.21
2,807.00	15.88	20.92	2,764.93	317.16	117.51	-29.99	0.77
2,902.00	17.34	22.74	2,855.97	342.36	127.62	-33.12	1.63
2,997.00	18.22	22.35	2,946.43	369.15	138.74	-36.80	0.93
3,092.00	16.55	20.74	3,037.09	395.54	149.18	-39.94	1.83
3,187.00	16.36	21.28	3,128.19	420.66	158.83	-42.64	0.26
3,281.00	14.88	19.51	3,218.72	444.38	167.66	-44.93	1.65
3,377.00	13.40	20.21	3,311.81	466.43	175.62	-46.81	1.55
3,472.00	13.50	22.76	3,404.21	486.99	183.72	-49.21	0.63
3,566.00	13.72	18.37	3,495.57	507.69	191.47	-51.26	1.12
3,661.00	14.82	16.17	3,587.64	530.05	198.41	-52.07	1.29
3,756.00	16.42	19.07	3,679.13	554.41	206.18	-53.16	1.87
3,851.00	17.69	19.39	3,769.95	580.72	215.36	-55.10	1.34
3,945.00	17.63	18.91	3,859.52	607.65	224.71	-57.04	0.17
4,040.00	16.65	18.70	3,950.30	634.16	233.74	-58.78	1.03
4,135.00	16.01	15.98	4,041.47	659.64	241.71	-59.77	1.05
4,229.00	15.34	17.74	4,131.97	683.95	249.07	-60.48	0.87
4,324.00	13.07	19.59	4,224.06	706.04	256.50	-61.84	2.44
4,419.00	12.85	17.00	4,316.64	726.26	263.19	-62.98	0.65
4,514.00	13.58	18.45	4,409.12	746.94	269.81	-63.93	0.84
4,609.00	12.89	16.91	4,501.60	767.66	276.42	-64.86	0.82
4,704.00	12.69	14.48	4,594.24	787.90	282.11	-65.03	0.60
4,799.00	12.68	15.61	4,686.92	808.05	287.53	-64.96	0.26
4,894.00	12.62	20.90	4,779.62	827.79	294.03	-66.05	1.22
4,989.00	13.65	24.00	4,872.14	847.72	302.30	-68.78	1.31

Design Report for Wells Ranch AA21-65-1HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,084.00	15.11	22.41	4,964.16	869.41	311.58	-72.03	1.59
5,178.00	13.79	21.57	5,055.18	891.16	320.37	-74.79	1.42
5,273.00	13.58	19.20	5,147.49	912.22	328.20	-76.81	0.63
5,368.00	12.69	15.65	5,240.00	932.80	334.68	-77.65	1.26
5,463.00	12.36	17.37	5,332.74	952.55	340.53	-78.10	0.52
5,559.00	11.47	22.91	5,426.67	971.15	347.31	-79.76	1.51
5,653.00	11.76	24.40	5,518.75	988.49	354.91	-82.53	0.44
5,748.00	12.00	24.83	5,611.71	1,006.26	363.05	-85.72	0.27
5,843.00	12.16	20.35	5,704.61	1,024.61	370.68	-88.25	1.00
5,929.00	11.85	20.08	5,788.73	1,041.39	376.86	-89.80	0.37
6,026.00	10.43	20.78	5,883.90	1,058.96	383.40	-91.49	1.47
6,073.00	10.87	1.97	5,930.11	1,067.37	385.06	-90.88	7.42
6,121.00	13.99	339.95	5,977.00	1,077.35	383.22	-86.49	11.71
6,168.00	15.44	330.97	6,022.47	1,088.16	378.24	-78.84	5.74
6,216.00	16.77	320.81	6,068.59	1,099.12	370.76	-68.74	6.48
6,263.00	17.87	311.20	6,113.47	1,109.12	361.05	-56.74	6.51
6,311.00	19.40	304.95	6,158.95	1,118.54	348.97	-42.61	5.24
6,358.00	21.62	296.42	6,202.98	1,126.87	334.81	-26.76	7.91
6,406.00	25.58	287.19	6,246.97	1,133.87	316.98	-7.71	11.26
6,453.00	30.27	283.29	6,288.49	1,139.60	295.75	14.28	10.70
6,500.00	36.17	281.68	6,327.80	1,145.13	270.61	39.98	12.69
6,547.00	40.29	282.52	6,364.71	1,151.24	242.18	69.02	8.84
6,596.00	44.81	284.41	6,400.80	1,158.97	209.98	102.13	9.59
6,643.00	48.02	286.48	6,433.20	1,168.05	177.17	136.16	7.54
6,691.00	51.19	285.32	6,464.30	1,178.06	142.02	172.71	6.86
6,738.00	53.30	281.83	6,493.08	1,186.76	105.90	209.84	7.39
6,786.00	54.34	277.11	6,521.43	1,193.12	67.71	248.37	8.23
6,833.00	56.59	274.60	6,548.07	1,197.06	29.20	286.56	6.50
6,880.00	61.50	273.35	6,572.24	1,199.84	-11.00	326.07	10.69
6,927.00	66.78	270.32	6,592.74	1,201.17	-53.25	367.19	12.64
6,975.00	72.95	267.47	6,609.26	1,200.28	-98.28	410.40	14.01
7,022.00	79.21	265.52	6,620.56	1,197.48	-143.79	453.57	13.91
7,071.00	84.68	265.58	6,627.42	1,193.72	-192.14	499.23	11.16
7,118.00	86.46	268.35	6,631.05	1,191.24	-238.93	543.72	6.98
7" Casing @ 7118' MD, 6631.05' TVD							
7,147.00	87.56	270.05	6,632.57	1,190.83	-267.88	571.55	6.98
7,242.00	88.55	269.02	6,635.79	1,190.06	-362.82	662.95	1.50
7,337.00	88.03	268.71	6,638.63	1,188.18	-457.76	754.05	0.64
7,432.00	90.22	272.77	6,640.08	1,189.41	-552.72	845.99	4.86
7,527.00	89.35	272.36	6,640.43	1,193.66	-647.62	938.67	1.01
7,622.00	87.62	268.96	6,642.95	1,194.76	-742.56	1,030.56	4.01
7,717.00	88.89	269.37	6,645.84	1,193.37	-837.51	1,121.80	1.40
7,811.00	90.77	269.93	6,646.12	1,192.80	-931.50	1,212.34	2.09
7,906.00	91.45	269.67	6,644.28	1,192.47	-1,026.48	1,303.89	0.77
8,001.00	90.77	270.03	6,642.44	1,192.22	-1,121.46	1,395.46	0.81
8,096.00	89.78	269.95	6,641.98	1,192.20	-1,216.46	1,487.12	1.05
8,191.00	88.73	269.65	6,643.22	1,191.87	-1,311.45	1,578.68	1.15
8,286.00	90.43	269.92	6,643.91	1,191.51	-1,406.44	1,670.23	1.81
8,380.00	89.11	268.58	6,644.29	1,190.28	-1,500.43	1,760.59	2.00
8,475.00	87.94	268.51	6,646.74	1,187.87	-1,595.37	1,851.55	1.23
8,570.00	88.61	269.31	6,649.60	1,186.07	-1,690.31	1,942.68	1.10

Design Report for Wells Ranch AA21-65-1HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,665.00	89.75	270.48	6,650.96	1,185.89	-1,785.29	2,034.28	1.72
8,759.00	90.15	271.32	6,651.04	1,187.37	-1,879.28	2,125.34	0.99
8,854.00	90.34	272.22	6,650.63	1,190.30	-1,974.23	2,217.73	0.97
8,949.00	90.22	269.74	6,650.17	1,191.93	-2,069.21	2,309.79	2.61
9,044.00	90.62	267.65	6,649.47	1,189.76	-2,164.18	2,400.85	2.24
9,139.00	91.39	267.99	6,647.80	1,186.15	-2,259.09	2,491.48	0.89
9,234.00	90.52	269.28	6,646.22	1,183.89	-2,354.05	2,582.50	1.64
9,329.00	89.69	267.70	6,646.05	1,181.39	-2,449.01	2,673.46	1.88
9,424.00	90.71	268.15	6,645.72	1,177.95	-2,543.95	2,764.15	1.17
9,518.00	89.69	269.05	6,645.39	1,175.65	-2,637.92	2,854.21	1.45
9,613.00	88.73	268.01	6,646.70	1,173.21	-2,732.88	2,945.19	1.49
9,708.00	89.51	268.40	6,648.16	1,170.24	-2,827.82	3,036.01	0.92
9,803.00	90.56	268.27	6,648.10	1,167.48	-2,922.78	3,126.90	1.11
9,898.00	91.63	269.03	6,646.28	1,165.24	-3,017.73	3,217.92	1.38
9,993.00	89.57	268.27	6,645.29	1,163.00	-3,112.69	3,308.96	2.31
10,087.00	88.95	268.85	6,646.50	1,160.64	-3,206.65	3,398.99	0.90
10,182.00	89.66	269.82	6,647.65	1,159.54	-3,301.64	3,490.34	1.27
10,277.00	88.30	270.84	6,649.35	1,160.08	-3,396.62	3,582.13	1.79
10,373.00	89.11	271.41	6,651.52	1,161.97	-3,492.57	3,675.20	1.03
10,468.00	88.30	269.72	6,653.66	1,162.90	-3,587.54	3,767.07	1.97
10,563.00	88.98	268.89	6,655.92	1,161.75	-3,682.51	3,858.39	1.13
10,657.00	89.88	269.58	6,656.85	1,160.50	-3,776.49	3,948.74	1.21
10,753.00	89.29	267.50	6,657.55	1,158.05	-3,872.45	4,040.69	2.25
10,847.00	90.12	267.26	6,658.03	1,153.76	-3,966.35	4,130.15	0.92
10,942.00	91.20	267.49	6,656.94	1,149.40	-4,061.24	4,220.56	1.16
11,018.00	91.08	268.06	6,655.43	1,146.45	-4,137.17	4,293.04	0.77
Final MWD Survey @ 11018.00ft							
11,080.00	91.08	268.06	6,654.26	1,144.36	-4,199.13	4,352.26	0.00
Straight Line Proj @ 11080' MD, 6654.26' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
950.00	949.97	-3.95	-1.00	Tie-On to Surface Gyros @ 950.00ft
1,014.00	1,013.96	-5.20	-1.65	First MWD Survey @ 1014.00ft
11,018.00	6,655.43	1,146.45	-4,137.17	Final MWD Survey @ 11018.00ft
11,080.00	6,654.26	1,144.36	-4,199.13	Straight Line Proj @ 11080' MD, 6654.26' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Wells Ranch AA21-65-1HN_BHL	285.24	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
250.00	950.00	Surface Gyros	Flexi-Shot
1,014.00	7,071.00	MWD Surveys - Intermediate	MWD

Design Report for Wells Ranch AA21-65-1HN - Final Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
7,147.00	11,018.00	MWD Surveys - Production	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
7,118.00	6,631.05	7" Casing @ 7118' MD, 6631.05' TVD	7	8-3/4

Wellbore Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Wells Ranch AA21-65- - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,415,075.01	3,296,554.19	40.467890	-104.434120
Point 1				0.00	4,149.88	-4,888.03	1,419,224.75	3,291,666.34	
Point 2				0.00	-1,173.61	-4,619.16	1,413,901.45	3,291,935.20	
Point 3				0.00	-1,093.58	558.57	1,413,981.47	3,297,112.74	
Point 4				0.00	4,172.17	339.35	1,419,247.03	3,296,893.53	
Point 5				0.00	4,149.88	-4,888.03	1,419,224.75	3,291,666.34	
Wells Ranch AA21-65- - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,415,075.01	3,296,554.19	40.467890	-104.434120
Wells Ranch AA21-65- - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,415,075.01	3,296,554.19	40.467890	-104.434120
Point 1				0.00	3,689.87	-4,428.01	1,418,764.75	3,292,126.34	
Point 2				0.00	-713.59	-4,159.14	1,414,361.45	3,292,395.20	
Point 3				0.00	-633.57	98.55	1,414,441.47	3,296,652.74	
Point 4				0.00	3,712.15	-120.67	1,418,787.03	3,296,433.53	
Point 5				0.00	3,689.87	-4,428.01	1,418,764.75	3,292,126.34	
Wells Ranch AA21-65- - actual wellpath misses target center by 2.40usft at 11080.00usft MD (6654.26 TVD, 1144.36 N, -4199.13 E) - Point	0.00	0.00	6,653.72	1,144.91	-4,201.40	1,416,219.88	3,292,352.95	40.471170	-104.449170

Directional Difficulty Index

Average Dogleg over Survey:	2.04 °/100usft	Maximum Dogleg over Survey:	14.01 °/100usft at 6,975.00 usft
Net Tortousity applicable to Plans:	1.05 °/100usft	Directional Difficulty Index:	6.337

Audit Info

North Reference Sheet for Sec. 21-T6N-R63W (Wells Ranch AA South 21) - Wells Ranch AA21-65-1HN

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to RKB=24 @ 4754.00usft (H&P 322). Northing and Easting are relative to Wells Ranch AA21-65-1HN

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996401

Grid Coordinates of Well: 1,415,075.01 usft N, 3,296,554.19 usft E

Geographical Coordinates of Well: 40° 28' 04.40" N, 104° 26' 02.83" W

Grid Convergence at Surface is: 0.69°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,080.00usft the Bottom Hole Displacement is 4,352.26usft in the Direction of 285.24° (Grid).

Magnetic Convergence at surface is: -7.68° (9 February 2014, , BGGM2013)

